The **Center for Advanced Systems Understanding** is a joint German-Polish research institute based in **Görlitz (Germany)** that unites the partners:

- **Helmholtz-Zentrum Dresden – Rossendorf (HZDR)**
- **Helmholtz Center for Environmental Research (UFZ)**
- **Technische Universität Dresden (Technical University of Dresden – TUD)**
- **Max Planck Institute of Molecular Cell Biology and Genetics (MPI-CBG)**

It has strong scientific collaboration with:

- *Wrocław University*
- *Warsaw University*
- *International Institute of Molecular and Cell Biology in Warsaw (IIMCB)*
- *Warsaw University of Technology*

CASUS
CENTER FOR ADVANCED
SYSTEMS UNDERSTANDING

Antonio Di Pilato
Professional support @ CASUS

4th CMS Job Matching Event - October 2021

Interdisciplinarity

CASUS
CENTER FOR ADVANCED
SYSTEMS UNDERSTANDING

We combine methods from **mathematics**, **systems theory**, **data science**, and **scientific computing** at a single location, with the aim to rethink data-intensive systems research.

Scientific team @ CASUS

- Matter under Extreme Conditions
- Earth System Science
- Systems Biology
- Autonomous Vehicles
- Digital Health
- High Performance Computing
- Machine Learning
- Data Analytics
- Visualization

HIRING !!!

Location in Görlitz

CASUS is located in **Görlitz**, the sixth largest town of the Free State of Saxony and part of Germany's easternmost district. Görlitz lies on the German-Polish border, opposite the Polish town of Zgorzelec and has a rich architectural heritage. **Many movie-makers have used the various sites as locations** (*thus the nickname "Görliwood"*)
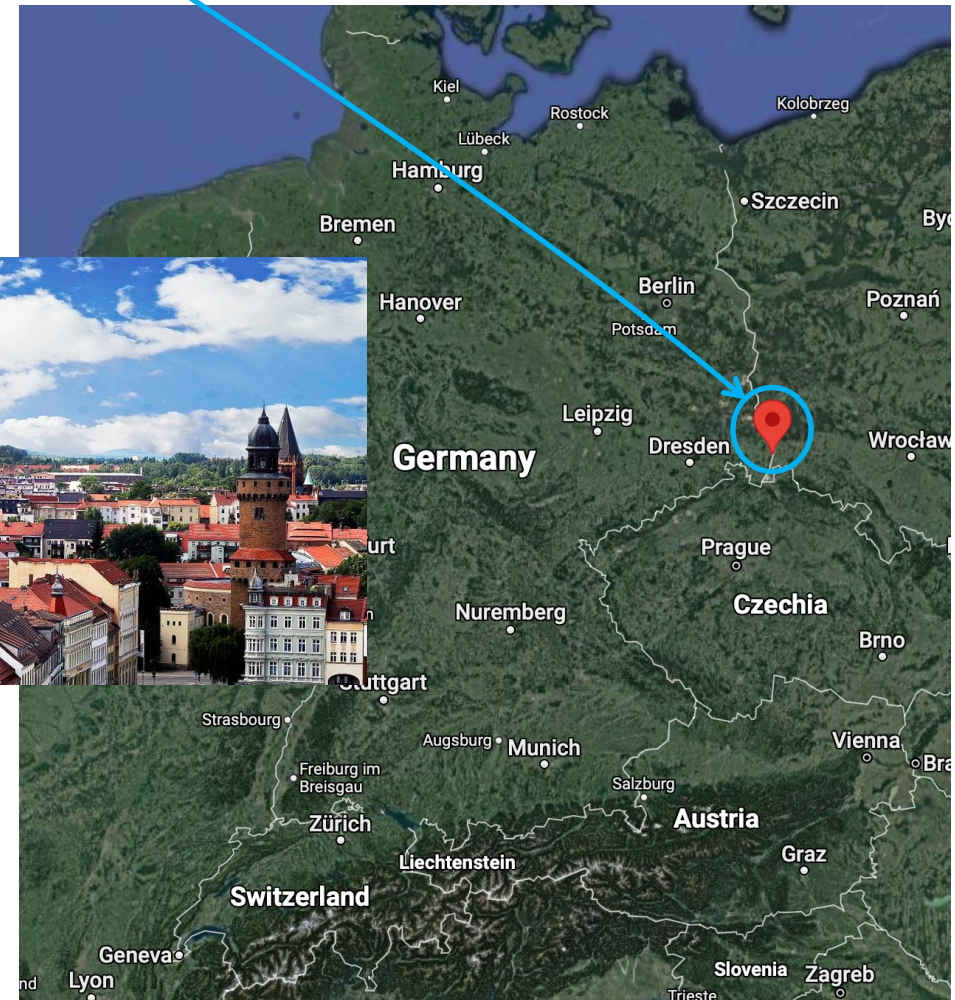
.... but if you prefer to live in a bigger city, **CASUS bus** from Dresden to Görlitz (and back) is still an option !!!

Job title: Alpaka support in CMSSW

ALPAKA (**A**bstraction **L**ibrary for **Pa**rallel **K**ernel **A**cceleration) is a header-only C++14 abstraction library for accelerator development.
It allows performance portability across different accelerator architectures, providing abstraction for the parallelism and for data management. This will lead to more maintainable software that can be built from a single source and run on different architectures, reducing the maintenance cost and avoiding the need of several implementations of the same algorithm.

Work @ CERN with the Patatrack Team!
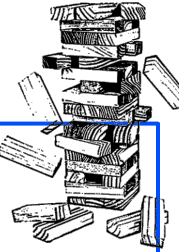
The **Patatrack team** at CERN has a leading role in the exploration of innovative software and hardware technologies to bring smart software closer to the detectors read-out at CERN experiments since 2016. The challenges of the reconstruction algorithms used by CMS are twofold:
* to achieve a high level of efficiency and accuracy;
* to meet the throughput and memory requirements of the experiment's online and offline computing infrastructure.

To reach these goals the Patatrack team has been **exploring parallel algorithms and heterogeneous reconstruction techniques**, and exploiting new architectures such as **GPUs** and **FPGAs**. After an initial prototyping, the introduction of a fully heterogeneous reconstruction in the CMS software will leverage portability frameworks.

Job details

Functions: development of the heterogeneous solutions applied to HEP event reconstruction (design and development of a run-time backend selector in CMSSW, optimization of the CMS software with Alpaka, design of user-friendly interfaces for common tasks such memory operations, work divisions optimisation, kernel launches, etc.).

Qualifications: Master's degree or PhD or equivalent relevant experience in the field of computing or physics or a related field.

Experience: C++ programming (C++11,14,17), implementation and optimization of algorithms on GPUs through CUDA, OpenCL or through abstraction layers (Alpaka, SYCL, Kokkos, etc), knowledge and application of software life-cycle tools and procedures (git, JIRA), development of application software (object-oriented design and development, parallel programming, algorithm development and optimization).

Additional details: Extended residence at CERN, or frequent travel to CERN if based in Görlitz.

Duration: one year initially and renewable annually, subject to mutual satisfaction and to continued CASUS funding.

Federal Government and Free State of Saxony secure CASUS funding until 2038

Research institute CASUS in Görlitz will receive annual budget of up to 15 million euros

Saxony's Minister President Michael Kretschmer and State Secretary Prof. Wolf-Dieter Lukas of the German Federal Ministry of Education and Research (BMBF) signed a declaration on the funding of the Center for Advanced Systems Understanding (CASUS) today at German-Polish research institute's Open House event. According to the agreement, CASUS will be funded until 2038. This long-term perspective will allow the "Old Capacitor Plant" on the Neisse River to be converted into a modern research facility. CASUS will be shaped as an institute of the Helmholtz-Zentrum Dresden-Rossendorf (HZDR) along with its partners Helmholtz Centre for Environmental Research in Leipzig (UFZ), Max Planck Institute for Molecular Cell Biology and Genetics in Dresden (MPI-CBG), Technical University of Dresden (TUD) and the University of Wrocław. The cooperation agreements were also signed at the CASUS Open House event.

© CASUS/N. Schmidt

Useful contacts

CERN & Patatrack team

Dr. Felice Pantaleo

felice.pantaleo@cern.ch

Dr. Andrea Bocci

andrea.bocci@cern.ch

CASUS & Alpaka team

Dr. Michael Bussmann

m.bussmann@hzdr.de

Dr. Antonio Di Pilato

a.di-pilato@hzdr.de